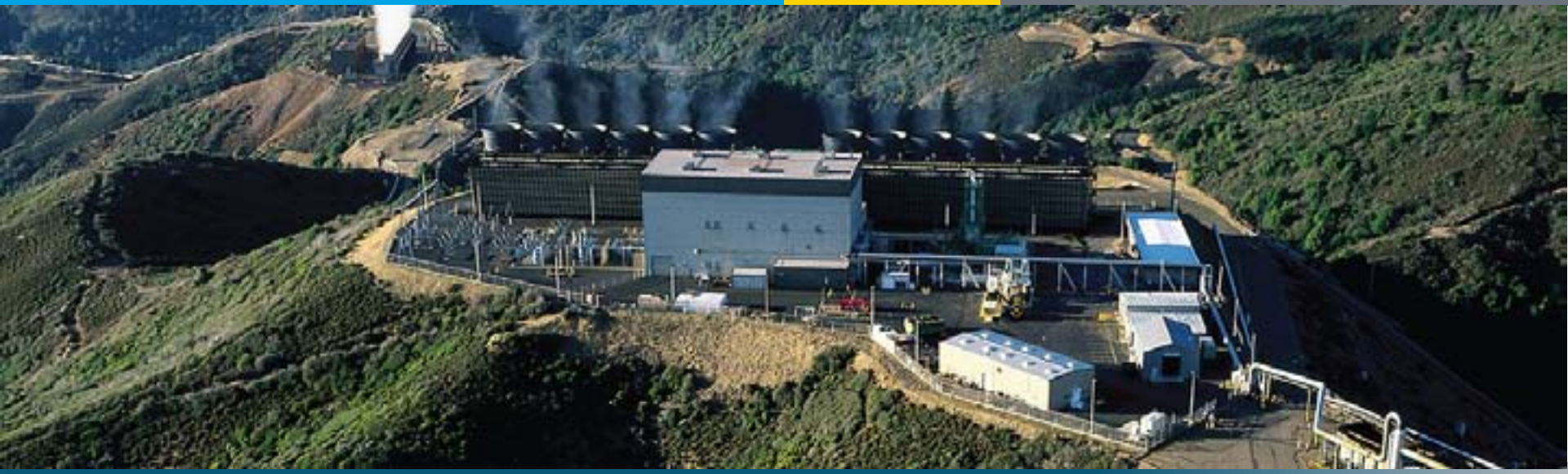
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



Low Temperature/Coproduced/Geopressured Subprogram Overview

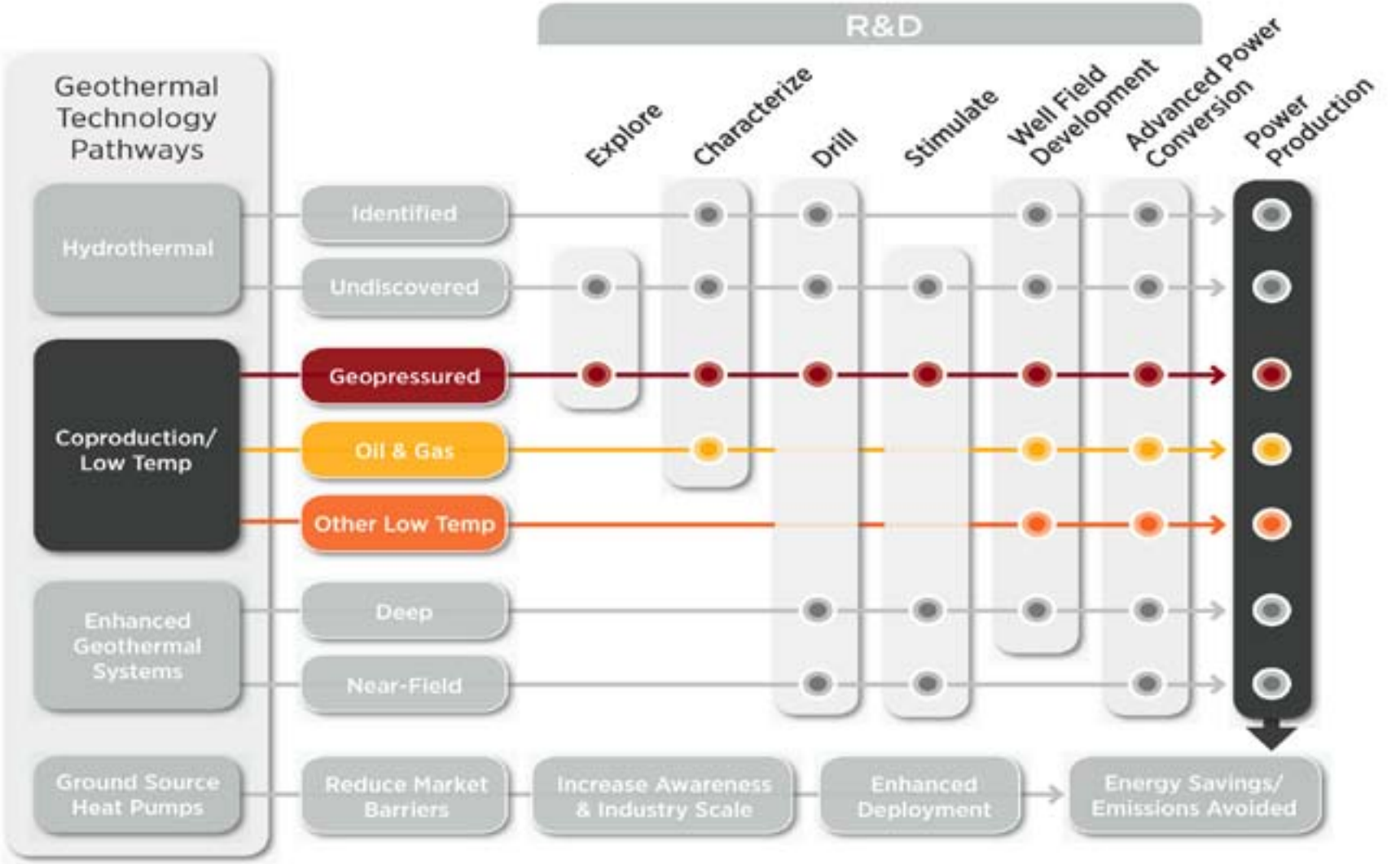
May 18, 2010

Geothermal Technologies Program Peer Review

Crystal City, VA

Tim Reinhardt
Geothermal Technologies Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Technology Pathway



Resource Potential – Low Temp/ Coproduction/Geopressured

Technology		Resource Potential Capacity	
		Capacity (GW_e)	Source(s) and Description
Coproduction and Other Low Temp	Coproduced (Oil & Gas)	12	MIT Report[2]
	Geopressured (Oil & Gas)	23 to 240	Assessment of Geothermal Resources of the United States – 1979, Geological Survey Circular 390. United States Department of the Interior, 1979. Muffler, I.J., Editor, 1979.
	Other Low Temp	Up to 1000 (GWt)	Geothermal Energy Under Our Feet – Technical Report: NREL/TP-840-40665[3] U.S. Geothermal District Heating: Barriers and Enablers[4]

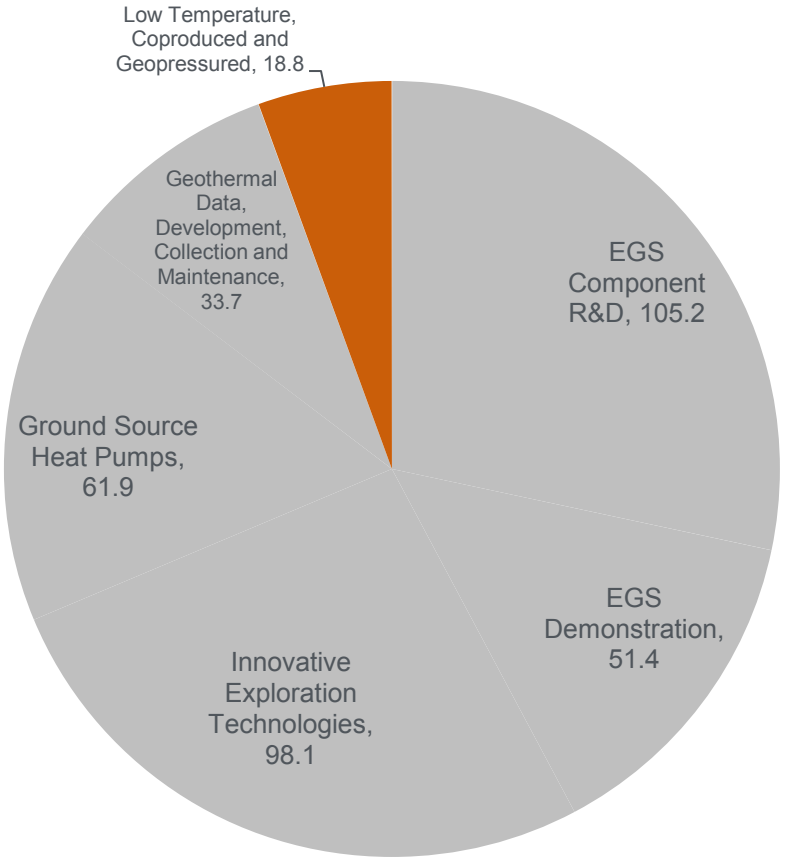
[1] (Williams, Reed et al., 2008b)
[2] (Tester et al., 2006)
[3] (Green and Nix, 2006)
[4] (Thorsteinsson et al., 2008)

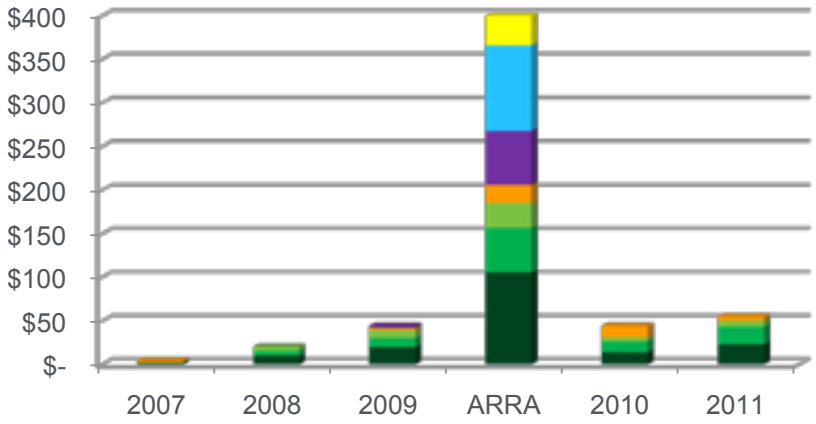
Coproduced Fluids – Enormous Potential

Energy Potential from Coproduced oil/gas fluids is substantial

- **In certain water-flood fields in the U.S. Gulf Coast region, the produced water/oil cut is 95%.**
  - Fields produce up to 50,000 barrels/day of fluid (20-40 wells)
  - Paid for (in terms of pumping costs), by existing operations
  - Water is shipped off site as a waste product
- **Collecting and passing this fluid through a binary electrical plant is readily performed**
  - Most produced fluid is already passed to a central collection facility for hydrocarbon separation and water disposal
  - Piggy-backing on existing infrastructure eliminates the need for expensive drilling and hydro-fracturing operations that are often required for EGS
  - Reducing the majority of the upfront cost of geothermal electrical power production is critical to its widespread use

DOE Investments





ARRA Awards

ARRA Topic	Grantee	Project Title	"Short" Description	DOE Award Amount*
Geothermal Demo	**Beowawe Power, LLC**	Beowawe Bottoming Binary Project	Beowawe Power, LLC will install a new low temperature binary unit that will be attached to an existing plant to provide 10% additional power.	$2,000,000
Geothermal Demo	**City of Klamath Falls**	Klamath Falls Geothermal Low Temperature Power Plant	This funding will faciliate construction of a low temperature power plant combined with a district heating system to help power the city of Klamath Falls, OR.	$816,100
Geothermal Demo	**Johnson Controls, Inc.**	Novel Energy Conversion Equipment for Low Temperature Geothermal Resources	Johnson Controls, Inc. will install a low temperature unit on the Oregon Institute of Technology Campus.	$1,047,714
Geothermal Demo	**University of North Dakota**	Electric Power Generation from Low-Temperature Geothermal Resources	The University of North Dakota will construct a power plant in Bowman County, ND, that will run off of low temperature (not coproduced) fluids.	$1,733,864
Geothermal Demo	**Oasys Water**	Osmotic Heat Engine for Energy Production from Low Temperature Geothermal Resources	Oasys Water plans to develop a new method for utilizing low temperature geothermal fluids to produce power.	$910,997

*Actual Award Amount may be different Subject to Negotiation

ARRA Awards

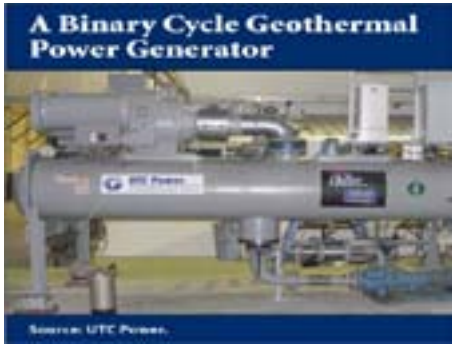
ARRA Topic	Grantee	Project Title	"Short" Description	DOE Award Amount*
Geothermal Demo	**Surprise Valley Electrification Corporation**	Rural Cooperative Geothermal Development Electric and Agriculture	Surprise Valley Electification Corporation will build a binary power plant utilizing low temperature fluids and enable the construction of a local aquaculture facility.	$2,000,000
Geothermal Demo	**Terra-Gen Sierra Holdings, LLC**	Dixie Valley Bottoming Binary Project	Funding for Terra-Gen Sierra Holdings will facilitate the installation of a low temperature binary unit that will add to power generation from the existing 60 MW Dixie Valley power plant.	$2,000,000
Geothermal Demo	**Universal GeoPower LLC**	Technical Demonstration and Economic Validation of Geothermally- Produced Electricity From Coproduced Water at Exisiting Oil/Gas Wells in Texas	Universal GeoPower LLC will utilize a modular low temperature binary unit to produce power from oil and gas wells in Liberty County, Texas.	$1,499,288
Geothermal Demo	**University of North Dakota**	Electric Power Generation from Coproduced Fluids from Oil and Gas Wells	The University of North Dakota will utilize a low temperature binary unit to produce power from oil and gas wells in Bowman County, North Dakota.	$1,733,864
Geothermal Demo	**Louisiana Tank, Inc.**	Demonstrating the Commercial Feasibility of Geopressured – Geothermal Power Development at Sweet Lake Field Cameron Parish, Louisiana	Louisiana Tank, Inc. will demonstrate the feasibility of a geopressured power plant in Cameron Parish, Louisiana.	$5,000,000

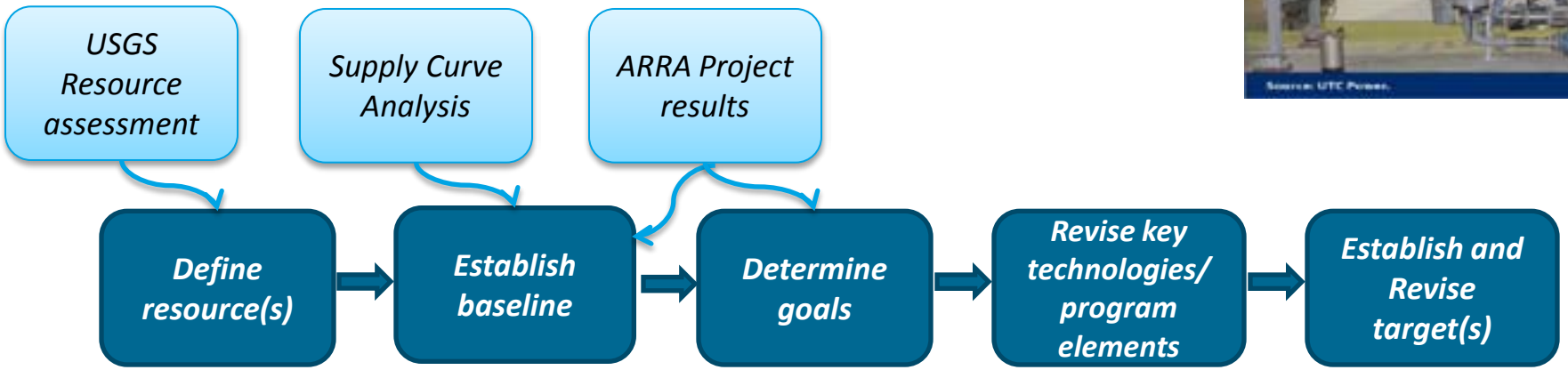
*Actual Award Amount may be different Subject to Negotiation

Reach 3 GW of Low Temp geothermal energy capacity by 2020

Opportunity in Market

- 3 GW of Low Temp geothermal energy by 2020 through combination of coproduced, geopressured and other Low Temp resources – (industry experts - 2/5/10)
- Roadmap to be completed by October 2010 in time to inform FY 2012 research, development and deployment planning
- Advances in technology (surface and downhole); improved education and outreach; and collaboration between government and industry will increase Low Temp market penetration
- Develop necessary tools to ease field deployment





New FOA

FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U.S. Department of Energy
Golden Field Office

The complete Funding Opportunity Announcement can be viewed on FedConnect:
www.fedconnect.net/FedConnect/PublicPages/PublicSearch/Public_Opportunities.aspx
DOE's Geothermal Technologies Program works in partnership with U.S. industry to establish geothermal energy as an economically competitive contributor to the U.S. energy supply.
For more information on these awards, please visit:
http://www1.eere.energy.gov/geothermal/low_temperature_resources.html

Funding will be available in the following topic areas:

A. Low-temperature geothermal fluids at temperatures up to 300° Fahrenheit (F) or approximately 150° Celsius (C)

B. Geothermal fluids produced from productive, unproductive, or marginal oil and gas wells, mining operations or other hydrocarbon or mineral extraction processes.

C. Highly pressurized or "geopressured" fluid resources that show potential for cost-effective recovery of heat, kinetic energy, and gas.

Thank you!

Tim Reinhardt
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Geothermal Technologies Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

http://www.eere.energy.gov/geothermal/ timothy.reinhardt@ee.doe.gov www.fedconnect.net